ADAPTIVE ANALYSIS STRATEGY FOR RADIONUCLIDE ANALYSIS

by Joanna Burger

The main objectives of our overall Amchitka work are 1) to determine whether the foods consumed from the marine ecosystem by the Aleuts and others are currently safe and pose no human health risk, and 2) to ascertain whether there is currently exposure of marine biota to radionuclides to provide a basis for long-term monitoring of the Amchitka marine ecosystem.

To that end we designed a biological sampling scheme that included the foods consumed by Aleuts and others, and that reflected the food chain and marine ecosystem near the test shots on Amchitka, and at the reference site (Kiska).

Our radionuclide analysis plan was to use 100 g samples for an INEEL screen of the suite of relevant radionuclides, and to achieve a broader gamma screen of a greater diversity of organisms at VU. The essence of science, however, is to conduct additional experiments where necessary to examine the key questions. For radiological analysis the variables that can be manipulated to achieve detectable levels involve either larger sample sizes, or longer counting times, or both.

Our initial INEEL screen of about 100 biological samples yielded non-detects for radiocesium, a radionuclide of considerable concern for human health and ecoreceptors in the marine environment. While the detection level was well-below that considered to pose a human health risk, non-detects do not provide useful information for comparing the biota in marine ecosystems around Amchitka with the reference site, on the overall comparative health of different species, nor do they provide any useful information for designing a biomonitoring plan (including species selection) for long-term stewardship and protection of human health at Amchitka.

Thus, our current analysis scheme takes into account the non-detect levels, and makes adaptive changes based on both counting times and sample quantity.

The next series of analyses will concentrate on two phases:

1) Counting 1000 gram samples where possible

a. Using Cod (fish) and Alaria (kelp) for obtaining detectable levels that can be used to compare Amchitka with Kiska

(and possibly among Amchitka sites).

b. Analyzing mainly Amchitka samples of key species of interest to the Aleuts and that are high on the food chain (Sea Lion, Halibut, Octopus) and are of interest to USFWS (Eagle, also high on the trophic food web).

c. Other species where sufficient sample exists to provide breadth of organisms on the food chain.

2) Continue with "the 300" specimens for gamma analysis of a variety of species to be sent to Vanderbilt.

a. This will continue the broad analysis of Aleut foods at all levels on the food chain (including mussels, Chinese hats, Gumboots, adult Eiders, gull eggs).

b. Provide additional information on biota at different levels on the food web (including a range of kelp and algae).

3) The relationship between 1 and 2 will depend upon the analytical results from the 1000 gram samples, and the optimization of in depth analyses (1000 g/48 hr) with the "300" samples (breadth on the food chain and of Aleut foods).

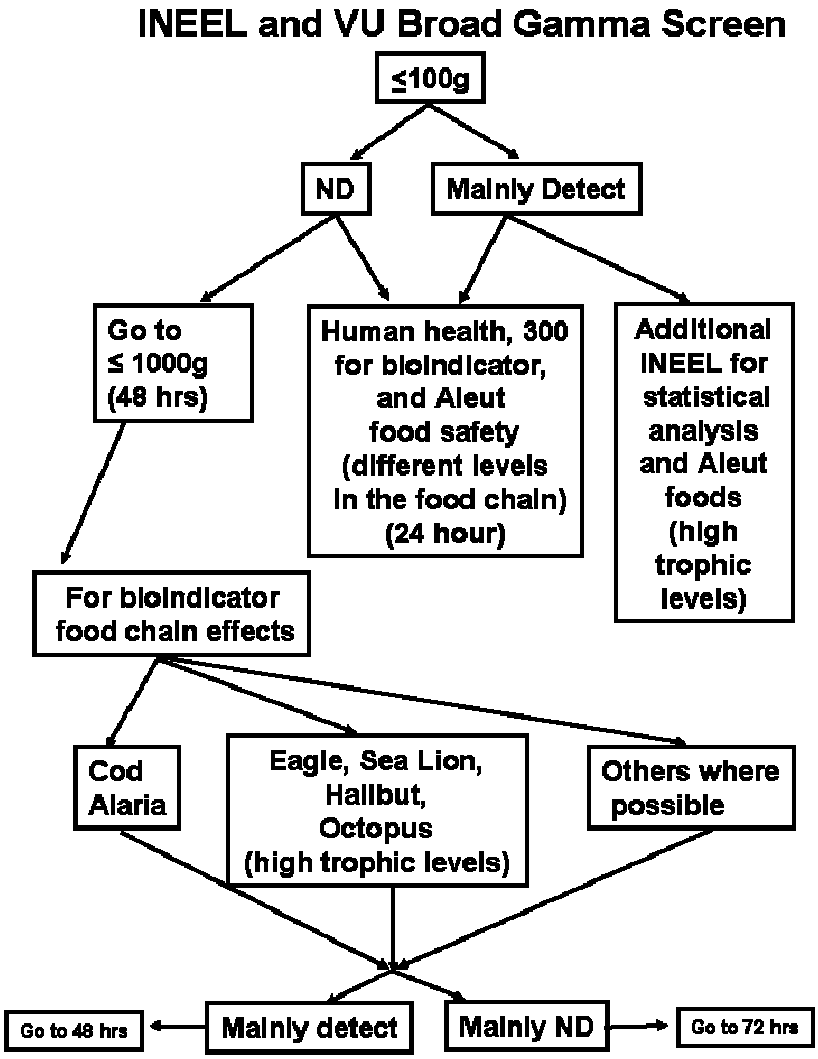
INEEL and VU Broad Gamma Screen
≤100g
ND
Mainly Detect
Go to
≤ 1000g
(48 hrs)
Human health, 300
for bioindicator,
and Aleut
food safety
(different levels
in the food chain)
(24 hour)
Additional
INEEL for
statistical
analysis
and Aleut
foods
(high
trophic
levels)
For bioindicator
food chain effects
Cod
Alaria
Eagle, Sea Lion,
Halibut,
Octopus
(high trophic levels)
Others where
possible
Go to 48 hrs
Mainly detect
Mainly ND
Go to 72 hrs

Figure 8.3